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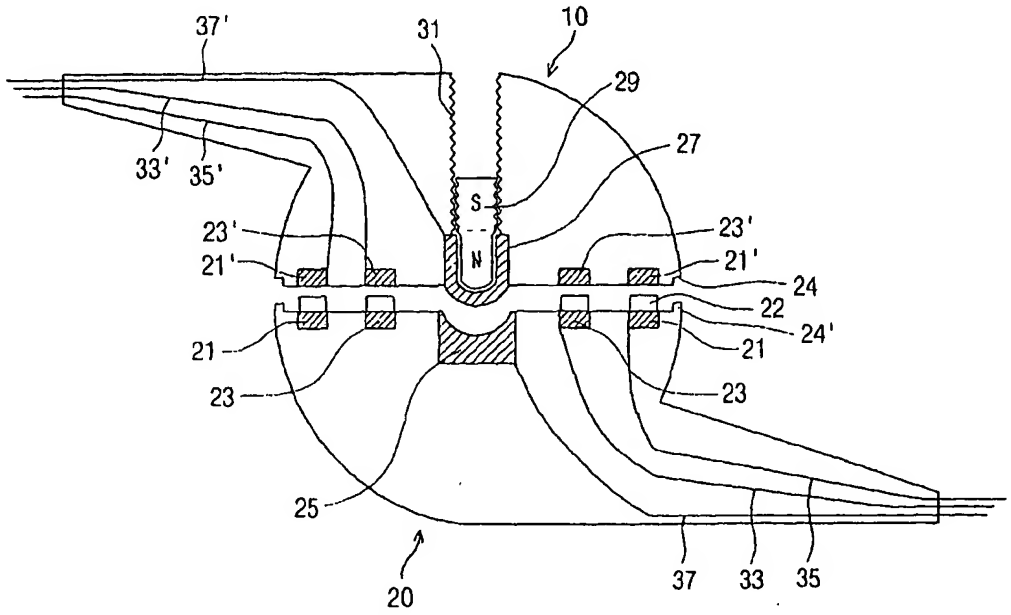
(54) Title: CONTACT TYPE PLUG-JACK



(57) Abstract: Disclosed is a contact type plug-jack, which comprises a magnet means for magnetically combining a plug and a jack, rather than the conventional insertion type plug-jack. The magnet means is mounted on both the plug and the jack, the respective magnet means having the opposite pole and so pulling each other. Therefore, when the plug and the jack approach, the magnetic force combines them, so that the audio signal can be transmitted from the jack to the plug, or vice versa.

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CONTACT TYPE PLUG-JACK

Technical Field

The present invention relates to a non-insertion, but contact type plug and jack device using a magnetic force.

Background Art

A plug and jack set (hereinafter, referred to as "a plug-jack") is used for connecting a headphone or an earphone to an audio systems such as a cassette player, MP3 player, etc. A conventional insertion type plug-jack is shown in FIG. 1. With regard to FIG. 1, a jack 13 is generally assembled to an audio system, and a plug 15, wired to a headphone or an earphone, is inserted into the jack 13. In a stereo audio system, a headphone wire is composed of a common ground line, a left-channel signal transmission line, and a right-channel signal transmission line. In a plug-jack in FIG. 1, contact parts 13a, 13b, 15a, 15b separated by hatched gaps are contacted to transmit and receive the left- and right-channel signals, respectively.

This conventional insertion type plug-jack is widely used because it assures a good contact between the plug and jack, but on the contrary, this merit may function as a demerit. For example, if a user get to sleep with a headphone or earphone put on, a wire of the headphone or earphone may bind and choke his or her neck because of rolling in bed during sleeping. In addition, if an audio system becomes more distant over the length of a headphone wire, the plug-jack may be broken unexpectedly.

Disclosure of Invention

This invention has been invented on the purpose of improving the demerits of the conventional insertion type plug-jack. Therefore, it is an object of the present invention to provide an contact type plug-jack device for connecting electrical signals via a plurality of wires, comprising: magnet means, respectively mounted on a contacting surface of the plug and the jack, for magnetically combining the plug and the jack, and signal connection means, respectively mounted on the plug and the jack, for connecting electrical signals transmitted from the plug to the jack.

In accordance with one aspect of the present invention, the magnet means comprises a permanent magnet fixed either on the plug or on the jack, and a metal piece fixed on the corresponding plug or jack, and the signal connection means comprises a first connection member fixed around the permanent magnet, and a second connection member fixed around the metal piece.

In the above, the magnet means is connected to a common ground wire, and the permanent magnet forms a screw, so that the permanent magnet may be inserted to and detached from the plug or the jack. Also, the signal connection means is made of a nickel- or gold-plated copper, and includes an elastic portion for providing elasticity when combining the plug and the jack.

In accordance with another aspect of the present invention, the magnet means comprises a first permanent magnet fixed on the plug, and a second permanent magnet fixed on the jack, the second permanent magnet having opposite polarity against the first permanent magnet fixed on the jack, and the signal connection means comprises a first member surrounding the first and the second permanent magnet, with an insulator interposed therebetween, and a second member surrounding the first member.

In the above, the magnet means, a first conncection member, and a second conncection member include an elastic piece, respectively.

Brief Description of Drawings

The above and other objects, features and advantages of the present invention will become more apparent from the following description when taken in conjunction with the accompanying drawings, in which:

FIG. 1 shows a conventional plug-jack,

FIG. 2 is a cross-sectional view of a contact type plug-jack according to one embodiment of the present invention, and

FIG. 3 is a cross-sectional view of a contact type plug-jack according to another embodiment of the present invention.

Preferred Embodiment for Carrying out the Invention

A preferred embodiments will be described herein below with reference to the accompanying drawings.

First Embodiment

FIG. 2 shows a preferred embodiment of the present invention, contact type jack-plug using magnets.

As shown, a jack 20 and a plug 10 form a circular shape, so their appearance seems similar to that of a conventional earphone. However, the basic principle of the present invention is not limited to the shown shape. The terms "a jack" and "a plug" would not be suitable for expressing the idea of the present invention, however, in the

description these terms will be still used, because this inventive idea was derived from the conventional insertion type jack and plug.

Turning to FIG. 2, in the central contacitng surface of the plug 10, a first combining member 27 is mounted, the member 27 being made of metal and securing a permanent magnet 29 therein. The permanent magnet 29 forms a male screw, and it is inserted into the plug 10 in combination with threads 31 formed in the plug 10. Because the permanent magnet 29 forms a screw, it can be freely inserted into and detached from the plug 10, and the magnitude of the magnetic force can be adjusted by controlling the interval between the permanent magnet 29 and the first combining member 27.

In the contacting surface, corresponding to the first combining member 27, of the jack 20, a second combining member 25 is mounted, the member 25 being made of metal and combining the first combining member 27 by the magnetic force of the permanent magnet 29 in the plug 10. To secure stable combination, the first combining member 27 forms a convex surface and the second combining member 25 forms a concave surface. To secure more stable combination, it is desirable that a protrusion 24' and a corresponding groove 24 are formed both on the plug 10 and on the jack 20, respectively. Of the matter of course, the second combining member 25 in the jack 20 may be made of a permanent magnet, with thought of a magnetic polarity.

Wires 37', 37 connected to the first and the second combining member 27, 25 are common ground lines. Signal connection members 21, 23, 21', 23' are mounted on the surfaces of the plug 10 and the jack 20. In this embodiment, the signal connection members are coaxially mounted around the centrally located first and second combining member 25, 27. The signal connection members 21, 23, 21', 23' play a role in transferring electrical signal from the plug to the jack, or vice versa. It is desirable that

the signal connection members are made of copper sheet or other high conductivity materials. It is more desirable that the signal connection members are plated with nickel, gold, etc. for protection from corrosion or oxidization. The signal connection members are formed coaxially around the first and second combining members 25, 27, and therefore, although the wire connected to either the plug 10 or the jack 20 is twisted, the signal connection members can always fulfill their duty.

Meanwhile, to reinforce the function of the signal connection members, i.e., to transfer electrical current therethrough, some portion of the signal connection members may be cut and elastically lifted, so that the signal connection members can be firmly contacted by the elastically lifted piece, when the plug and the jack combine each other. Of course, this way is only an exemplary case, and the person who is skilled in the art could select various techniques to meet the requirement. For example, a commutator and a brush technique in a motor technology may be adapted.

In this embodiment, like the conventional headphone or earphone, the plug 10 and the jack 20 have left-channel lines 33, 33', right-channel lines 35, 35', and common ground lines 37, 37'. The right-channel lines 35, 35' are connected to the outermost signal connection members 21, 21', the left-channel lines 33, 33' are connected to the intermediately located signal connection members 23, 23', and the common ground lines 37, 37' are connected to the first and second combining members 25, 27.

Second Embodiment

FIG. 3 shows a sectional view of another embodiment of the present invention, contact type jack-plug using magnets. On the central portion of a jack 40 and a plug 30, permanent magnets 41, 41' are fixed, respectively. Either one of the permanent magnets

may be replaced by a metal piece, of course.

Around the permanent magnet 41, 41', an insulator 43,43' is formed. A first signal connection member 45, 45', which is electrically conductive and also magnetic, surrounds the insulator 43, 43'. Since the first signal connection member, which is magnetic, surrounds the permanent magnet 41, 41' to cover the magnet's N- and S-pole, the magnetic force from the permanent magnet 41, 41' is shielded by the signal connection member and it can work only between the plug 30 and the jack 40. A second signal connection member 47 is coaxially mounted around the first signal connection member 45, 45', like in First Embodiment.

In FIG. 3, reference numerals (41") attached to the permanent magnet 41', (43") attached to the first signal connection member 45', and (47') of the second signal connection member denote elastic pieces that provide elastic force when the plug and the jack combine each other. That is, when the magnet 41' of the jack 40 and the magnet 41 of the plug 30 magnetically combine each other, the respective elastic pieces 41", 43", 47' secure firm combination of the plug and the jack and further good electrical contact between the signal connection members.

Also in this embodiment, like a first embodiment, the jack and plug have left-channel lines 53, 53', right-channel lines 55, 55', and common ground lines 51, 51'. The left-channel lines 53, 53' are connected to the first signal connection members 45, 45', the right-channel lines 55, 55' are connected to the second signal connection members 47, 47', and the common ground lines 51, 51' are connected to the permanent magnets 41, 41'.

From the foregoing, a contact type plug-jack according to the present invention

provides much easier connection rather than a conventional insertion type plug-jack. Since this plug-jack can be easily detached by little force, although a user get to sleep with a headphone or earphone put on, wire's binding and choking his or her neck can be protected. This plug-jack may be adapted to portable cassette or CD players, MP3 players, mobile phones and hands-free devices for vehicle use, and any other sound-to-vibration conversion apparatuses.

While the invention has been shown and described with reference to a certain embodiment to carry out this invention, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims.

What Is Claimed Is:

1. A plug-jack device for connecting electrical signals via a plurality of wires, comprising:

magnet means, respectively mounted on a contacting surface of the plug and the jack, for magnetically combining the plug and the jack, and

signal connection means, respectively mounted on the plug and the jack, for connecting electrical signals transmitted from the plug to the jack.

2. A plug-jack device of claim 1,

wherein the magnet means comprises a permanent magnet fixed either on the plug or on the jack, and a metal piece fixed on the corresponding plug or jack,

wherein the signal connection means comprises a first connection member fixed around the permanent magnet, and a second connection member fixed around the metal piece.

3. A plug-jack device of claim 2, wherein the magnet means is connected to a common ground wire.

4. A plug-jack device of claim 2, wherein the permanent magnet forms a screw, so that the permanent magnet may be inserted to and detached from the plug or the jack.

5. A plug-jack device of claim 2, wherein the signal connection means is made of a nickel- or gold-plated copper, and includes an elastic portion for providing

elasticity when combining the plug and the jack.

6. A plug-jack device of claim 1,

wherein the magnet means comprises a first permanent magnet fixed on the plug, and a second permanent magnet fixed on the jack, the second permanent magnet having opposite polarity against the first permanent magnet fixed on the jack,

wherein the signal connection means comprises a first member surrounding the first and the second permanent magnet, with an insulator interposed therebetween, and a second member surrounding the first member.

7. A plug-jack device of claim 6, wherein the magnet means, a first conncection member, and a second conncection member include an elastic piece, respectively.

DRAWINGS

FIG. 1

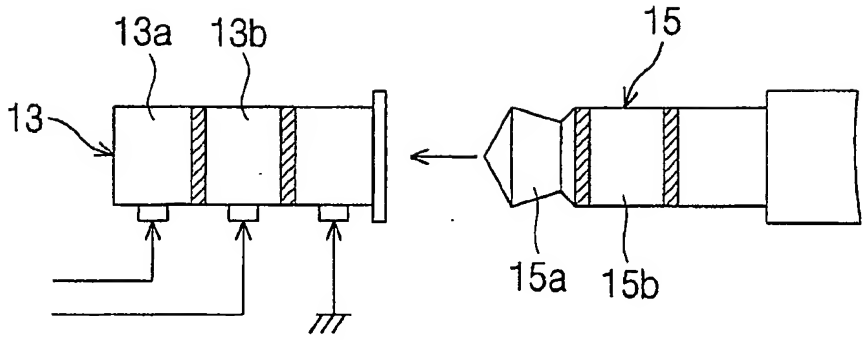


FIG. 2

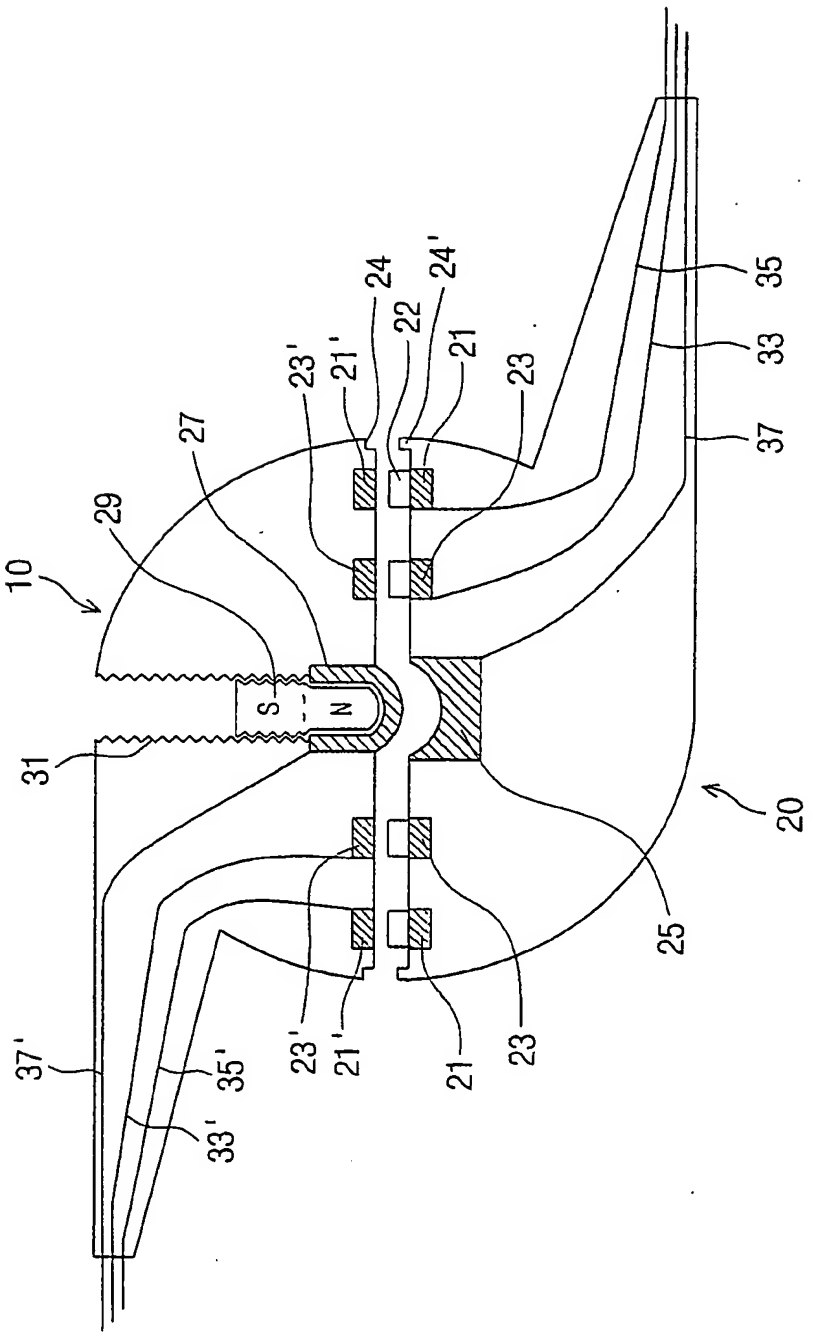
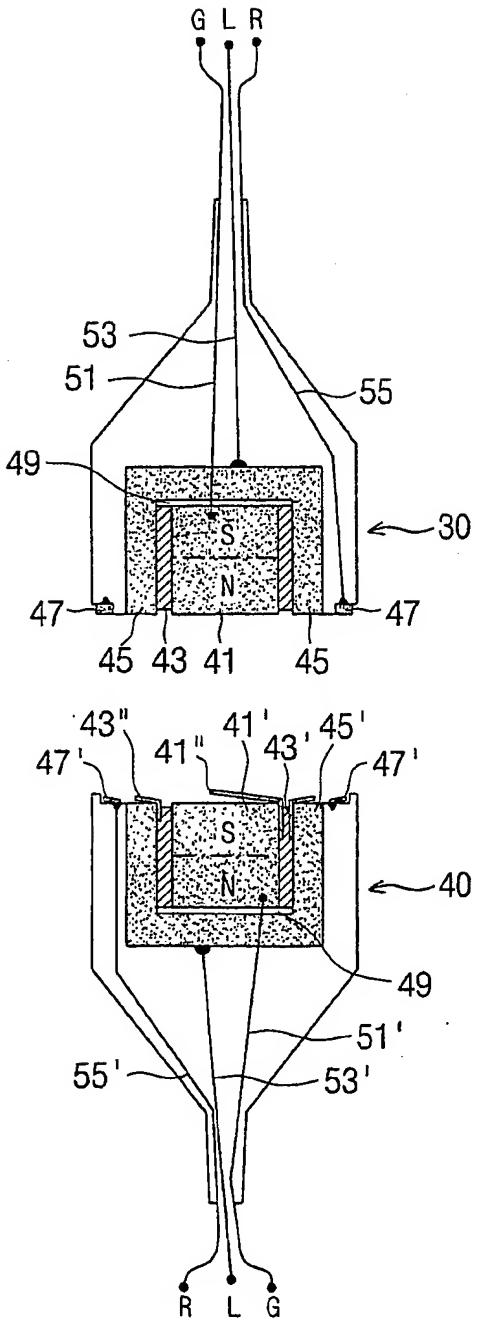


FIG. 3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INTERNATIONAL SEARCH REPORT

ional application No.
PCT/KR02/00670

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 H01R 24/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 H01R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

KR IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	KR1998-31784 U(DAEWOO Electronics Co.) 17 August 1998 see the whole document	1, 2 3 - 7
X Y	KR1994-13699 U(J. S. Park) 25 June 1994 see the whole document	1, 2 3 - 7
Y	JP 2000-12145 A(Matsushita Electric Co.) 14 January 2000 see the whole document	1 - 7

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:
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Date of the actual completion of the international search	Date of mailing of the international search report
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